

INFORMATION COMMUNICATION: A KEY TO COPING WITH EFFECTS OF CLIMATE CHANGE ON AGRICULTURE IN AFRICAN RURAL COMMUNITIES

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ABSTRACT

This paper is focused on the reality of global warming in Africa, effects of climate change on cropping systems, food production, mixed agriculture, livestock production systems, pastoral systems and coastal communities based on available data as gathered from various literature. Issues such as vulnerability and risk, land degradation water management, forestry, biodiversity are reviewed. The roles of information and information gap in coping with characteristics of climate change are also reviewed and suggestions proffered on the use of Information and Communication Technology (ICT) tools as a means of coping with, adapting and militating against the effects of climate change on agriculture.

INTRODUCTION

Climate change or global warming as defined by Mastrandrea and Schneider (2008), is the measurable increase in the average temperature of earth's atmosphere, oceans and land masses. Scientists believe that the earth is currently facing a period of rapid warming brought on by rising levels of heat trapping gases known as greenhouse gases in the atmosphere. Greenhouse gases retain the radiant energy (heat) provided to earth by the sun in a process known as the green house effect. Greenhouse gases occur naturally and without them, the planet would be too cold to sustain life. Mastrandrea and Schneider (2008) further ascertained that human activities have added more and more of these gases into the atmosphere and concluded that there is now undeniable evidence that global temperatures are increasing based on direct temperature measurements, rising sea level, and changes in the life cycles of plants and animals.

It is generally believed that the developing countries will suffer more from impacts of global warming than the big polluters in Europe and North America. Vulnerable countries must be assisted to adapt to the new situation through effective dissemination of information to the populace. Farmers, fishermen and rural communities have to be kept informed and supported in identifying methods of adaptation to the changing environment.

Information gap is a big problem in achieving this because all plans made or concepts and methods formulated, without the people most affected by climate change being adequately informed will be in vain. This paper sets out to discuss the impacts of climate change on agriculture and examine the role that Information Communication Technology can play in coping with these effects.

EFFECTS OF CLIMATE CHANGE ON AGRICULTURE AND LIVESTOCK

Scientists have made many projections about how global warming or climate change will affect weather, glacial ice, sea levels, agriculture, wildlife and human health. Many changes linked to rising temperatures are being observed. According to Killmann (2007) the sacking of Rome in the fifth century was as a result of climate change. As a result of the weather in Northern and Central Europe during this period, the region became so inhospitable that the reduced crop yields forced the inhabitants to move southward, increasing pressures on the Roman Empire. He posits that society; agriculture and the climate are intricately interlinked.

Global warming of a few degrees may increase agricultural production, but not necessarily in the same places where crops are grown now. For instance according to United Nations Environment Program (UNEP) report (2007), the increased temperatures extend the growing season of trees and plants species

which once grew in the south of countries of the Northern hemisphere are now spreading towards the North. Southern Canada for instance may benefit from more rainfall and a longer growing season. In France, maize, which is currently cultivated and irrigated in the south, could migrate due to lack of water and milder temperatures to the northern plains over the next century. Cereal output is set to rise in North America, while that of fruit is already growing in France. Production of wheat, maize and pasture land is going to increase. Also, on an overall scale, the agriculture of these regions is going to benefit from the changes, while the dry tropical regions may become further impoverished, because unlike temperate zones, the growing season becomes shorter when the temperature rises. More worrying are changes in the length of the rainy season and rainfall intensity. Since these factors have a direct impact on crops, falling outputs in area where communities rely almost exclusively on agriculture have a devastating effect and Africa is particularly susceptible. According to Marstranrea and Schneider (2008) "farming regions such as California's central valley that brings in irrigation water from distant mountains may suffer as the winter snow pack, which functions as a natural reservoir melts before the peak growing months. Crops and woodlands may also be afflicted by more insects and plant diseases."

Farmers will need to adapt to the changing conditions such as shifting the types of crops grown or investing in drought or heat – tolerant varieties. Scientists estimate that warming of up to about 5.4 degree Fahrenheit could increase global agricultural potential, but that further warming is likely to decrease these potentials. Production of crops like maize, millet, and rice are likely to decline generally because of shortage of rainfall due to climate change. Researchers at the International Livestock Research Institute (ILRI) as noted in ICT Update(2007), posits that secondary stresses triggered by climate change are likely to include the spread of pest and alien species, biodiversity losses, increase of human and animal diseases and that climate change will affect livestock by changing the yield and nutritional quality of fodder, increasing disease and disease spreading pest, reducing water availability and making it difficult to survive in an extreme environment. The United Nations Environment Program (UNEP) (2007) studies in Tanzania show that fish production in Lake Tanganyika has dropped dramatically over the past decade due to increased temperatures while the receding of Lake Chad's water is expected to continue unabated.

In many areas in Africa, as the rains diminish and the rainy seasons become fewer and more unpredictable, the types of crops that can be grown become ever more restricted. Water forces cattle and sheep farmers to move to more fertile regions, leading to conflicts over grazing land and water. In Nigeria, climate change related problems include the disappearance of the lake Chad, desert encroachment in various parts of northern Nigeria and its sacking of various communities and villages in the area, sea level rise and coastal erosion in the south west, gas flaring and oil related pollution in Niger Delta region, gully erosion in the south east and the erratic weather conditions in virtually all parts of the country such that farmers no longer know when the planting season commences.

ROLES OF INFORMATION COMMUNICATION.

Farmers and the rural communities require access to information in order to mitigate and adapt to the effects of climate change on agriculture and their general livelihood. They need to know whether the changing circumstance in which they grow their plants or raise their animals is merely a question of variability or permanent change to weather patterns. Specifically, communities across the countries that are most vulnerable need channels through which they can share information on strategies that have worked well for them and to adapt such techniques to their own circumstances whenever possible.. Meteorological information needs to be communicated on time and farmers must be informed of strategies that can help in choosing different crops or changing planting dates according to rainfall predictions. Gathering of weather data information from the grassroots needs to be improved. There is also, the need to provide automatic weather monitoring units in the most vulnerable regions in Africa. It is not only a matter of the centre delivering information to the grassroots but of the grassroots also delivering information back to the centre. Timely information gathering will allow the local planners to make decisions that will minimize the damage of any phenomenon to their communities. People must be warned not only about what will happen tomorrow but also to forecast about things that are going to happen years into the future. This information will help people to take appropriate decisions at appropriate time".

THE USE OF INFORMATION COMMUNICATION TECHNOLOGY TOOLS.

There are various ICT tools that can be used for gathering, analyzing and disseminating information on climatic change. Many of these tools are already put to use in some parts of Africa and other developing countries where the effects of climate change are more pronounced. According to Anders (2007) in Niger Republic, Telecoms Sans Frontiers introduced a satellite communication network that enables agricultural information to be delivered from isolated areas to decision makers in time to prevent the food security crises that emanates from decreased rainfall, soil erosion, degradation and desertification. Previously, this information took weeks to arrive. Also in the Caribbean, Ham radio is being used to pass information from weather stations to local communities and emergency services and back again in order to militate against hurricanes. Web 2.0 could be used to provide information on climate change to farmers and rural communities. Government departments, international agencies and even local NGOs will be able to access the information provided by weather centers and combine it with local data that organizations are already collecting. In addition, ICT tools such as Wikis, Mashups and Blogs provide other means whereby people can examine and make use of the information generated.

Saunby (2007) claimed to be working on a particular tool that can measure the impacts of climate change on certain areas along with seasonal weather forecasts for upwards of six months. According to him, these weather details can be merged or mashed up – with other web 2.0 tools such as Google maps or blogs to produce local maps showing, for example how the risk of flooding may increase in the future. Such maps could provide planners with valuable information on where to build new houses or roads. They could also provide farmers with information on where to plant next season's crops or how best to irrigate their fields. This information could be made available to interested institutions from where it could be disseminated to climate scientist for further research.

Apart from the fact that the use of internet tools can help to make climate data relevant to ordinary people by providing farming communities access to the information they need to plan how best to use their land, Web 2.0 will also allow decision makers to formulate worthwhile policies.

Computers could be used to produce models of likely weather patterns and this information could be useful for planning responses to the future impacts of climate changes.

Also information about climate change can be passed to the rural community through the use of radio, television, posters, bulletins and telephones.

THE WAY FORWARD

For the use of information communication tools to serve as a means of combating the effect of climate change on agriculture in Africa, a number of things need to be put in place.

- There is the need for government and all stake holders to urgently implement any climate change adaptation measures in Africa. For instance Sirakumar (2007) reports that the World Meteorological Organization (WMO) advocated that meteorological networks in Africa should be improved with more stations opened in areas that are critical for a country's food security using GIS technology to quickly analyze many layers of information on crops, soils, physical infrastructure and so on and identify communities that are most at risk.
- Meteorological stations need to be increased in number to provide sufficient spatial coverage more generally.
- There is the need to put in place a system that ensures that collected data are analyzed and disseminated to farming communities, without delay.
- According to Jarraud (2006) 200 automatic weather units that are equipped with small data loggers that can recover information in units of one minute, 15 minutes or every hour

- depending on what is needed were said to be needed across Africa. That these automatic weather units speed up the process of providing reliable weather forecasts to rural communities. Data from the monitoring units can be received via satellite or telephone, analyzed and passed on to radio or TV stations which can then pass them on to farmers in the form of bulletins. Moreover, as the data are collected in digital format, they can be fed into computer models to generate climate change scenario.
- Ensuring timely provision of agrometreological forecasts and products on temperature, rainfall, droughts and floods, crop water use, pests and diseases to assist farmers through the use of ICT tools like the internet, computer, the TV, the radio, etc.
- Providing timely information through the use of ICT to collect, analyze, and disseminate weather information to farmers and the rural community and capacity building must be a priority project for all the tiers of government, the NGOs and all the stake holders.

CONCLUSION

It is an established fact that information dissemination plays a major role in coping with the devastating effect of climate change on agriculture and that the role the news media, radio, television, computer and the internet, and the print media play in generating and delivering crucial information on climate change to the communities that need it can not be over emphasized.

The best way to generate and disseminate this information is for all agencies and groups including the government, the NGOs, information workers, librarians and all stake holders to collaborate.

Meteorological networks should be treated by government the same way as a country's health system, with its network of hospitals. Dealing with climate change is no different but just as important for our survival if not more so. Therefore, we need to invest in networks that collect the weather data and provide the information when needed.

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